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ABSTRACT

The paper describes benefit-cost analysis, reviews how benefit-cost analysis has been used to evaluate human investment as applied to mental retardation programs, and critiques the benefit-cost technique. The first part focuses on problems associated with the definition and measurement of benefits and costs, the rationale of discounting and the choice of a discount rate, suboptimization, and the question of the distributional impact of programs. In the second part the paucity of benefit-cost evaluations of mental retardation, vocational rehabilitation programs in underlined by reference to some program evaluations which are not benefit-cost studies as well as to the few efforts which do fall within this framework. The concluding section evaluates some of the recent criticisms against benefit-cost analysis. (Author/DB)

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BENEFIT-COST ANALYSIS AND THE EVALUATION OF MENTAL RETARDATION PROGRAMS

By

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ABSTRACT

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This paper has three parts: (1) a description of benefit-cost analysis; (2) a review of how it has been used to evaluate human investment, especially mental retardation programs; and (3) a concluding critique of the benefit-cost technique. The first part focuses on problems associated with the definition and measurement of benefits and costs, the rationale of discounting and the choice of a discount rate, suboptimization, and the question of the distributional impact of programs. Second, the paucity of benefit-cost evaluations of mental retardation programs is underlined by reference to some program evaluations which are not benefit-cost studies as well as to the few efforts which do fall within this framework. The concluding section evaluates some of the recent criticisms against benefit-cost analysis.

BENEFIT-COST ANALYSIS AND THE EVALUATION OF MENTAL RETARDATION PROGRAMS

by

William B. Neenan 1/

1. INTRODUCTION

This paper has a double purpose: (1) to present a simplified yet critical discussion of the benefit-cost technique and (2) to explore the applicability of this technique to the evaluation of mental retardation programs. This double task will be accomplished in three stages: (1) a description of benefit-cost analysis; (2) a review of how it has been used to evaluate human investment and, more specifically, mental retardation programs; and (3) a concluding critique of benefit-cost analysis.

2. BENEFIT-COST ANALYSIS

The origin of benefit-cost analysis construed in the narrow sense of quantifying in dollar terms the costs of a project and comparing them with the dollar value of the outcomes of a project is of comparatively recent origin. The Flood Control Act of the 74th Congress in 1936 stipulated that the U. S. Federal Government should undertake water resource projects "if the benefits to whomsoever they may accrue are in excess of estimated costs." In the intervening years the technique has

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1/ I am grateful to Ronald W. Conley for his comments.

been refined amidst a growing consensus concerning technical details to be utilized in evaluating such projects. In the 1960's benefit-cost analysis and the related technique, cost-effectiveness analysis, were given prominence when the PPBS (Planning-Programming-Budgeting System) was endorsed by President Johnson and all federal agencies were required to evaluate their programs in terms of these techniques. At this time notable efforts were made, especially by the Department of Health, Education, and Welfare, to evaluate human investment programs. Most recently, these techniques have been increasingly applied to measure the impact of various activities on the quality of the environment.

Basic Concept

The basic concept of benefit-cost analysis is simple.[1/] It is a systematic attempt to compare the inputs of any action with its outcomes in terms of a commensurable unit, usually monetary. The purpose of such an exercise, of course, is to determine whether the outcome is worth the candle. Harberger concludes a discussion of benefit-cost analysis directed to his fellow economist with this peroration:

> And so, having made my plea, let me salute the profession with what might well have been the title of this paper, with what is certainly the key that points to the solution of most problems in applied welfare economics, with what surely should be the motto of any society that we

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1/ For a survey article that discusses all the major problems associated with benefit-cost analysis and reviews the literature to that date, see A. Prest and R. Turvey, "Cost-Benefit Analysis: A Survey," Economic Journal, 75 (1965), pp. 683-735.

applied welfare economists might form, and what probably, if only we could learn to pronounce it, should be our password:

$$1. \quad \text{"}\int_{z=0}^{z^*} \sum_i D_i(z) \frac{\delta X_i}{\delta z} dz\text{"} \quad \underline{1/}$$

where D_i = the excess (distortion) of marginal social benefit over marginal social cost per unit level of an outcome i.

X_i = the number of units of outcome i.

z = the policy variable whose effects we wish to measure.

This notation can be clarified, even if not put into pronounceable form, by applying it to a hypothetical mental retardation program. Assume we are evaluating a special education program that provides counseling and vocational guidance to help clients move from high school to unsheltered full employment. First, we need to know the technical relationship between small program changes, say, hiring one more counselor, and the program outcome which can be defined in terms of hours of counseling and vocational guidance but ultimately must be expressed in terms of finding full, unsheltered employment for a student. This technical relationship is expressed by $\frac{\delta X_i}{\delta z}$. The measurement of such an input-output relationship is necessary but not sufficient in itself for benefit-cost analysis. We

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1/ Arnold C. Harberger, "Three Basic Postulates for Applied Welfare Economics," Journal of Economic Literature, IX (1971), pp. 796-797. This article is reprinted in a volume that promises to be the first in an annual series of collected articles dealing with topics related to benefit-cost analysis. [A.C. Harberger, R. Haveman, J. Margolis, W. A. Niskanen, R. Turvey, and R. Zeckhauser (eds.) Benefit-Cost Analysis 1971 (Chicago: Aldine-Atherton, 1972), 485 pp. There are several articles appearing in this first volume that are relevant to mental retardation program evaluation.]

may know, for example, that eighty placements will result from adding one counselor to a staff for one year but this information alone does not allow us to judge whether the candle, in this instance the placement of eighty students, is worth the resource cost of one counselor for one year. Comparing eighty placements with one teacher is like comparing a partridge with a pear tree. They are in themselves incommensurable.

D_i introduces the common denominator which allows us to evaluate the technical relationship $\left(\frac{\delta X_i}{\delta z}\right)$ in terms of comparable benefits and costs. If we: (1) can estimate the total gains evaluated in dollar terms accruing not only to one student but also to the rest of society because of his placement, and (2) we know the cost of one counselor for one year, then (3) since we know the technical relationship between teacher input and placement $\left(\frac{\delta X_i}{\delta z}\right)$, we can easily determine D_i, or the gain (or loss) to society resulting from one student being moved from high school to unsheltered full employment by the program. The total gain (or loss) to society from the program depends on how large the program is, or in terms of the above notation, how large is z^*, the input measured in terms of counselors employed.

Price Signals

There is nothing particularly arcane about the nature of benefit-cost judgments. They are contained at least implicitly in all decision processes. The effects of an intricate benefit-cost calculus, for example, are seen in the price signals generated by the market economy. Assume first an individual with given tastes, educational level, income and wealth. These in turn are aggregated over all consumers and, through interaction with market supply conditions, they determine the relative price structure,

which is the private market's relative evaluation of all goods. Thus the consumer possessing his own peculiar material and psychic endowments performs at least implicitly a benefit-cost calculation whenever he chooses from the possibilities that confront him. These choices feed information back into the market system,which are in turn reflected in the relative prices of final products and factor inputs.

In the public sector, however, evaluative signals are generated only vaguely and intermittently through such devices as voting and the various modes of political action. The fact that no political mechanism attaches unequivocal dollar values to political actions does not mean that public services provide no benefits to individuals. Reality is more extensive, even when considering merely individual economic welfare, than can be recorded on the T-accounts of private enterprise. Benefit-cost analysis has been developed in the hope of at least partially overcoming this informational lacuna by generating signals similar to those that are provided automatically in the private market by the "invisible hand."

There are thus three main tasks for benefit-cost analysis:

1) the identification and quantification of all the benefits attributable to a particular program,

2) the identification and quantification of all costs attributable to the program,

3) the translation of benefits and costs into a comparable common denominator, typically their present value.

Program Benefits

Public services provide benefits to individuals in both a direct and indirect manner. Direct benefits often cannot be essentially distinguished from the benefits individuals enjoy from the consumption of goods and services supplied by the private market. Water service, trash disposal, parking space, and medical treatment are sometimes provided privately, sometimes publicly. These services are often best financed through user fees which serve the same allocational function as do prices in the private market. Indirect benefits, however, which may be called external benefits, introduce us to the realm of collective goods, in which a service directly benefiting one individual also generates some value for others. In more formal terminology, a service generating indirect benefits may be said to enter as an argument in the utility functions of two or more individuals.

Since one person's enjoyment of a collective service does not preclude another's enjoyment and often is even necessary for it, services which generate indirect benefits are called nonrival in consumption. Public health, education, and welfare programs are examples of services which provide indirect benefits to groups other than the direct recipients of the program. Because the price mechanism usually cannot be used to ration services which are nonrival in consumption, it is often impossible to make a market-type evaluation of the indirect benefits of these programs, and thus program outcomes which would result simply from market interactions would not be welfare maxima. For example, to the extent that people in society other than mental retardates themselves receive some monetary or psychic

gain from programs directly affecting mental retardates, there will be underprovision of these programs if only the mental retardates are called upon to pay for benefits received.

Program benefits can also be viewed as either consumption or investment benefits. A consumption benefit is any psychic satisfaction generated by a program. An investment benefit is any increased capitalized net economic worth attributable to a program. Investment benefits can be translated into consumption benefits in future periods. Consumption benefits generated by a mental retardation counseling program might, for example, be 1) the increased emotional adaptability of the retardate, 2) reduced anxiety and stress among his siblings, and 3) satisfaction that third parties in society derive from knowing that mental retardates are being given such assistance. Investment benefits from such a program might be 1) the present value of the increased income flow which the retardates would earn as a consequence of the counseling as well as 2) the economic value of the personal services and physical resources which are now freed for other uses due to the increased independence of the retardate. Despite computational complexities which may be encountered, it should usually be possible to make fairly accurate estimates of investment benefits. However, due to the problems inherent in obtaining an accurate measure of such nonmarket values as attitudes of individuals toward programs, the measurement of total consumption benefits is more problematic.

All program benefits, whether they be classified direct and indirect, or consumption and investment, should normatively be considered benefits

only if they are actually judged to be such by some beneficiaries. Neither program analyst, priest, pope, nor even party chairman can legitimately assert when a course of action benefits any other citizen. The citizen alone must judge that.[1/] Benefit-cost analysis therefore is a computational device for discovering what this citizen evaluation is when automatic evaluations from the private market are either deficient or totally wanting. Its ultimate grounding, however, is conceptually the evaluation of individuals.

Program Costs

Program costs should be measured in reference to the opportunity cost of a program, that is, what must be foregone in order to provide the service. The motto for decision-makers living in a world with limited resources should be: "There is no such thing as a free lunch." Program benefits are purchased only in return for certain costs. Hence it must be asked: How would these resources have been employed if they were not used here? If they would all have been totally unemployed, then the

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1/ That the consumer's evaluation is the ultimate criterion of the economic benefits of a program was first sketched out nearly a century and a half ago by a French mathematician Jules Dupuit: "To sum up, political economy has to take as the measure of utility of an object the maximum sacrifice which each consumer would be willing to make in order to acquire the object... Thus when a bridge is built and the state establishes a tariff, the latter is not related to cost of production: the heavy cart is charged less than the sprung carriage even though it causes more wear to the timber of the carriageway. Why are there two different prices for the same service? Because the poor man does not attach the same value to crossing the bridge as the rich man does, and raising the charge would only prevent him from crossing. Canal and railway tariffs differentiate between the various classes of goods and passengers, and lay down markedly different rates for them although the costs are more or less the same... The purchaser never pays more for the product than the value he places on its utility." [Jules Dupuit, "On the Measurement of the Utility of Public Works," in Kenneth J. Arrow and Tibor Scitovsky (eds.) Readings in Welfare Economics (Homewood: Richard D. Irwin, 1969), pp. 261-262.]

opportunity cost of this particular program is zero.[1/] If they could have been used in some other program, however, then the value of the foregone benefits in the supplanted program is the real cost of the program in question.[2/] In most instances factor prices of program inputs are a reasonably good first approximation of the opportunity cost of resources

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1/ Haveman and Krutilla contend that the existence of unemployment and excess capacity should be allowed for in calculating the costs of public works. They construct a social opportunity cost adjustment factor for the U. S. economy which allows for the possibility that resources used in public works may be drawn from otherwise unemployed resources. Consequently the real cost to society is less than would be estimated if actual factor prices were used in the estimation. Since benefit-cost ratios will thus necessarily be higher, more projects will be approved than when costs are based on factor prices. See Robert H. Haveman and John V. Krutilla, Unemployment, Idle Capacity and the Evaluation of Public Expenditures (Baltimore: The Johns Hopkins Press, 1968), 159 pp.

Harberger, however, argues that in some instances the presence of chronic unemployment may mean that the opportunity cost of labor may be higher than a market wage. This could occur if there were individuals who were voluntarily unemployed vis-a-vis certain low-paying positions but involuntarily so vis-a-vis higher paying positions. Thus the supply price for these individuals would lie between the going wage in the low-paying and high-paying positions. When job opportunities develop in the latter category some of the positions would be filled by those whose supply price was between the two going rates. On the basis of this analysis Harberger contends that the social opportunity cost of such workers is definitely nonzero, even though they were previously unemployed, and indeed may well be greater than the current wage level for the low-paying positions. See Arnold C. Harberger, "On Measuring the Social Opportunity Cost of Labour," International Labour Review, 103 (1971), pp. 559-579.

2/ For a rigorous discussion of the place of opportunity costs in economic evaluation, see James M. Buchanan, Cost and Choice (Chicago: Markham, 1969), 104 pp.

utilized in any particular program.[1/]

Discount Rate

An important final step must be taken before benefits and costs can be compared. Benefits and costs which are realized in the future must be discounted to a common present value basis by an appropriate discount rate. Discounting is especially important in the case of evaluations for human investment programs since the time horizon over which they generate benefits often varies notably across programs. The higher the discount rate the more favorable will be the benefit-cost ratio for programs with a short payoff period relative to programs with a longer payoff period.[2/] The effect of discounting can be seen by referring to the following generalized objective function characteristic of a benefit-cost analysis conducted with no budget constraint:

1/ Conley suggests that the negative effects of a mental retardation program should be considered as an offset to benefits rather than as an element of cost. Thus the "cost" concept would be reserved to measure resources consumed directly in the provision of a service. The hardship imposed on his family when an institutionalized retardate, for example, is returned to the community would in this scheme be considered a deduction from benefits rather than an addition to costs. See Ronald W. Conley, The Economics of Mental Retardation (Baltimore: The Johns Hopkins University Press, 1973), Chapter VI. That this decision to treat adverse effects as negative benefits rather than positive costs has substantive significance for a benefit-cost calculation can be seen from this example. Assume that positive benefits from a program are 100, direct program costs 50, and adverse effects 10. If the adverse effects are deducted from benefits the benefit-cost ratio is 1.8. However, if the adverse effects are added to the direct costs then the benefit-cost ratio is only 1.7.

2/ DeAlessi has pointed out that an empire-building bureaucrat should prefer a low to a high discount rate. A low discount rate will generate the most favorable benefit-cost ratios for that subset of projects with the same total benefits and total costs which have 1) higher costs in the present and 2) larger benefits in the future. The practical outcome is that large investment outlays will be approved for the present time with returns in the distant future. This in turn means greater authority for the bureaucrat. See Louis DeAlessi, "Implications of Property Rights for Government Investments," American Economic Review, LIX (1969), pp. 13-24.

2. Max: Present Net Value of the Program $= \sum_{t=0}^{n} \frac{B_t - C_t}{(1 + r)^t}$

Subject only to the constraint that the present value of the program ≥ 0

where B_t = program benefits in year t

C_t = program costs in year t

r = appropriate discount rate

n = time horizon for evaluation of the program

Assume that 1) the total cost of the project is 10, all incurred in period 0; and 2) benefits of 4, 4, and 4 are realized in periods 2, 3, and 4 with none realized after that. It is clear that there exists a discount rate which can reduce the present net value of the program below zero. For example, with a discount rate of six percent the present net value of the program is .09. However, if the discount rate is seven percent the present net value is a negative .19.[1/] Under the simple decision rule that accepts any program whose benefit-cost ratio is greater than one, the program would be approved with a six percent discount rate but disallowed with a seven percent rate.

One of the most controversial aspects of benefit-cost analysis concerns precisely this question of the choice of an appropriate discount rate. There

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1/ With a discount rate of .06 the present net value of the program is calculated as follows: $\frac{4.00}{(1.06)^2} + \frac{4.00}{(1.06)^3} + \frac{4.00}{(1.06)^4} - \frac{10.00}{1} = 10.09 - 10.00 = .09$.
With a discount rate of .07 the present net value of the program is: $\frac{4.00}{(1.07)^2} + \frac{4.00}{(1.07)^3} + \frac{4.00}{(1.07)^4} - \frac{10.00}{1} = 9.81 - 10.00 = -.19$.

are in general two contrary approaches to this problem based, respectively, on the contentions that the discount rate should reflect social time preferences and private opportunity cost.[1] Those espousing social time preference contend that the choice of a rate for discounting benefits and costs of public projects is reductively a political determination of the relative value of present and future consumption. The private opportunity cost school, on the other hand, argues that since the real cost of public investment is the marginal rate of return on investment foregone in the private sector, this private rate of return should be used to discount future values. In practice the social time preference school generally advocates the use of a lower discount rate than do those favoring a private opportunity rate. Consequently they implicitly favor more public investment than does the latter group. But even though a consensus does not exist concerning the rationale for choosing a rate of discount, there is absolutely no controverting the judgment that some nonzero discount rate must be used in benefit-cost analysis.[2]

1/ For a good, brief discussion of the issues involved in this controversy by an advocate of the social time preference approach, see Peter O. Steiner, Public Expenditure Budgeting (Washington: The Brookings Institution, 1969), pp. 42-57.

2/ Even though there may be no controverting it in theory, there has been considerable disregard of discounting in practice. In a survey of twenty-three federal agencies a few years back only ten reported that they currently discounted benefits and costs. Another eight reported that they "planned to do so in the future" and five apparently did not even have plans to do so. See Elmer B. Staats, "Survey of Use by Federal Agencies of the Discounting Technique in Evaluating Future Programs," in Harley H. Hinrichs and Graeme M. Taylor (eds.) Program Budgeting and Benefit-Cost Analysis (Pacific Palisades: Goodyear, 1969), pp. 212-228.

Criteria for Choice

Once a program's benefits and costs have been estimated and discounted to a present value a criterion must then be applied to determine which programs should be adopted.[1/] Under the strong assumption that there is no budget constraint, two decision rules are applicable: 1) a program should be adopted on efficiency grounds if the present value of its total benefits is greater than the present value of its total costs; and 2) the scale of the program should be increased to the point where marginal benefits from the program equal marginal costs. However, if there is a budgetary constraint, which is the more typical situation, then the applicable decision rule is that the difference between the present value of benefits and costs should be maximized.

Constraints and Suboptimization

In the discussion to this point two important assumptions have been accepted: 1) that programs are to be evaluated with no operative budgetary constraints and from the viewpoint of society at large; and 2) that benefits and costs are to be calculated with no attention given to their equitable distribution. Both these assumptions warrant further attention. In point of fact all benefit-cost analyses concern programs that exist in a context of financial budgetary constraint and suboptimizing behavior. Due to the financial constraints agencies are prevented from automatically either adopting a program whose net benefit is positive or expanding it to

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1/ Three criteria have been proposed for evaluating programs: 1) the benefit minus-cost, 2) the benefit-cost ratio, and 3) the internal-rate-of-return criterion. The benefit-minus-cost criterion is the one adopted here. For a good discussion of these criteria and their particular strengths and weaknesses, see Jesse Burkhead and Jerry Miner, Public Expenditure (Chicago: Aldine-Atherton, 1971), pp. 215-224.

the margin where program benefits equal costs. Instead some choice must be made among programs all or many of which presumably have a benefit-cost ratio greater than one. Furthermore, governmental agencies may be assumed to suboptimize their behavior, that is, they maximize goals which may well be in conflict with goals of higher levels of government or of society at large. Shoup has pointed out two important benefit-cost problem areas where local government suboptimizing behavior ("worm's eye local view") may well conflict with grand optimization ("bird's eye national picture").[1/] 1) Local governments seeking to maximize the welfare of their own citizens will discount the future at a lower rate than the opportunity cost to society of foregone investment if, as is the case in the United States, local government borrowing is subsidized by the federal and state governments. 2) They will also consider merely the locally borne tax-costs of a program rather than the real resource cost to society. To the extent local taxes are exported to other jurisdictions, decisions based on a local benefit-cost calculus will differ from those based on a national perspective. A similar distortion can arise if exported benefits are disregarded.

Distributional Pattern

There has been increasing uneasiness recently with the emphasis placed by benefit-cost analysis on maximizing aggregate output to the neglect of distributional outcomes. Formal welfare economics traditionally has been

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1/ Donald C. Shoup, "Effects of Suboptimization on Urban Government Decision-Making," Journal of Finance, XXVI (1971), pp. 547-564.

concerned with the analysis of criteria which assure that the Pareto frontier is reached. Since the Pareto criterion accepts as normative any existing distribution of resources it is essentially a conservative force.[1/] It is not necessary, however, that even a program whose benefit-cost ratio is considerably in excess of one meets the Pareto requirement that some citizens enjoy thereby a welfare gain with no citizen suffering a welfare decrement. Typically some people suffer reduced welfare from programs that notably increase total output. Even more disturbing is that the most efficient programs in benefit-cost terms may well have distributional implications which are directly contrary to public policy.[2/]

A health or education project directed to a high income target population may often generate greater marginal benefits than one directed to a lower income population. For example, a screening program among high income professionals may discover fewer cases of disease than among a low income population, but efficiency benefits, measured in terms of aggregate increased income attributable to the screening, may well be greater for the program directed to the high income group.

1/ However, some income redistribution may well be compatible with the Pareto criterion. See Harold M. Hochman and James D. Rodgers, "Pareto Optimal Redistributions," American Economic Review, LIX (1969), pp. 542-557.

2/ Kenneth Boulding expressed in verse his concern over precisely such a possible outcome of a California water development plan:

"It would be well to be quite sure
Just who are the deserving poor,
Or else the state-supported ditch
May serve the undeserving rich."

Similarly, if benefits are measured in terms of market productivity, there is a built-in bias against programs directed toward women, with their lower labor force participation rates than men, and older people who have retired from the work force. Likewise programs designed to serve profoundly or severely retarded individuals, who usually never enter the labor force, will necessarily have little or no payoff if measured in terms of increased market productivity.

Some distributional consideration can be introduced into benefit-cost analysis by modifying efficiency benefits with equity weights designed to reflect the relative value attached to a dollar payoff to different groups. Thus a disease screening program among high income professional people may well have a high dollar efficiency return, but no one other than the direct participants may be willing to support these programs. Consequently the equity weights for these benefit dollars would be zero and the weighted benefit-cost ratio would be zero. On the other hand, a program to improve the social adjustment of mental retardates in low income families might well possess a high equity weighting and thus even though the efficiency return may be negligible, the program would have a weighted benefit-cost ratio considerably greater than one.

The introduction of equity-weighted efficiency benefits into benefit-cost analysis has hitherto foundered on the practical question: How should such weights be determined? Various approaches have been suggested: use the weights that are implicit in previous political decisions, such as in the determination of income tax rates; derive them

by analyzing voting data; or from attitudinal surveys.[1/] Each of these procedures, however, leaves something to be desired.[2/] Harberger and Wisecarver capture fairly well the current skeptical attitude of economists concerning the feasibility of incorporating distributional considerations in benefit-cost analysis. "That this concern is justified in most cases cannot be denied, but no one has as yet come up with a systematic measure of net redistributional benefit or cost that has even a remote chance of commanding widespread professional support. In this area we must confess to being pessimists in the sense that we doubt that the profession will approach consensus on any formal mechanism for dealing quantitatively with the welfare impacts of distributional changes."[3/]

3. HUMAN INVESTMENT AND PROGRAM EVALUATION

Although Adam Smith considered human endowments to be part of the capital wealth of a nation, only recently have economists used the concept

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1/ For a critical discussion of these points, see Burton A. Weisbrod, "Income Redistribution Effects and Benefit-Cost Analysis," in Samuel B. Chase, Jr. (ed.) Problems in Public Expenditure Analysis (Washington: Brookings Institution, 1968), pp. 177-209; and Richard A. Musgrave, "Cost-Benefit Analysis and the Theory of Public Finance," Journal of Economic Literature, VII (1969), pp. 797-806.

2/ For an attempt to measure the de facto distributional effects of a program by deducing the weights that are implicit in the outcomes of a tuberculosis screening program, see William B. Neenan, "Distribution and Efficiency in Benefit-Cost Analysis," Canadian Journal of Economics, IV (1971), pp. 216-224.

3/ Arnold C. Harberger and Daniel Wisecarver, "Preface," in A. C. Harberger, R. Haveman, J. Margolis, W. A. Niskanen, R. Turvey, and R. Zechkauser (eds.) Benefit-Cost Analysis 1971 (Chicago: Aldine-Atherton 1972), p. xxi.

of human investment extensively in the analysis of health and education programs. Some of the reluctance to incorporate the human capital concept into economic analysis has no doubt been based on the feeling that its use is somehow demeaning to an understanding of a person as a morally independent being.[1/] Such reluctance, however, seems misplaced in view of the analytical development and practical applications of this concept in the past decade which have proved valuable in evaluating health and education expenditures. In the only significant attempt to calculate the benefits and costs of mental retardation programs Conley relies implicitly on the human capital model.

In his analysis Conley first discusses the nature of programs in five major mental retardation program areas:

1) residential care
2) educational efforts for those not institutionalized
3) clinical services, such as diagnosis, evaluation, counseling, and referral
4) employment programs
5) income maintenance benefits under Social Security, public assistance, and the Veterans Administration.[2/]

1/ For a history of the use of the "human capital" concept by economists, see B. F. Kiker, "The Historical Roots of the Concept of Human Capital," Journal of Political Economy, 74 (1966), pp. 481-499. A landmark paper in this connection is Theodore Schultz' presidential address to the American Economic Association in 1960 on "Human Investment." An important seminal work is Gary Becker, Human Capital (New York: Columbia University Press, 1964), 187 pp. Numerous monographs as well as articles in the major economic journals have appeared in recent years utilizing the human capital model. The Journal of Human Resources has, since its founding in 1966, specialized in human investment evaluations.

2/ Ronald W. Conley, The Economics of Mental Retardation (Baltimore: The Johns Hopkins University Press, 1973), Chapter IV.

Flowing from program expenditures in these five areas, four major types of benefits may be inferred which are potentially includable in a benefit-cost calculation:

1) increased productivity of retardates

2) reduced cost of care for retardates

3) psychic gains to retardates

4) psychic gains to the families of retardates and to others. 1/

The first two of these benefits, increased productivity and reduced cost of care, are investment benefits. The psychic gains to both

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1/ Dodson and Cole provide this list of potential benefits to be included in a benefit-cost evaluation of vocational rehabilitation programs:

"1. increase in earnings
2. increase in homemaking services and care of children
3. other nonpaid work, for example, farming
4. unpaid work beyond normal occupation, that is, work after hours
5. savings in medical and custodial costs incurred by the client
6. savings in medical, custodial, and institutional costs incurred by the state
7. changes in the output of other family members; for example, if a rehabilitant gets a job, another family member may leave the labor force
8. psychic benefits, such as
   a. improvements in functional capability for non-earnings-related activities, for example, recreation
   b. improvements in the family situation
   c. insurance for the effects of disability for society in general

Additional taxpayer benefits include:
1. increased taxes on the increased earnings
2. savings in transfer payments, such as Social Security, public assistance, and Workman's Compensation"

Richard Dodson and Charles B. Cole, "An Introduction to Cost Benefit Analysis of the Vocational Rehabilitation Program: A Model for Use by State Agencies," Institute of Urban and Regional Development, University of California, Berkeley, October, 1972, p. 18.

The "additional taxpayer benefits" cannot properly be included in a benefit-cost calculation without double-counting. If gross earnings are counted as a benefit then the tax contribution out of these earnings pertains to the question of distribution which, as we have noted above, is not handled in a benefit-cost study *per se*.

retardates and others are consumption benefits. Thus programs designed to assist mentally retarded persons to function more adequately in society may conceivably generate both investment and consumption benefits. Although there have been numerous evaluations of programs directed to the mentally retarded[1/], there has been scant attempt to evaluate programs in terms of the human capital concepts which are typically employed in the benefit-cost studies of other health and education programs. Often costs of the program to be evaluated are not carefully computed, control groups have not been carefully selected, and the outcomes of programs have been only qualitatively estimated. Thus, in terms of equation 1, neither $D_i(z)$ nor $\frac{\delta X_i}{\delta z}$ have been calculated.

1/ For a bibliography of "Follow-Up Studies" through 1964, see Joel R. Davitz, Lois J. Davitz, and Irving Lorge, Terminology and Concepts in Mental Retardation (New York: Bureau of Publications, Teachers College, Columbia University, 1964), pp. 123-127.
For a list of research concerning mental retardation sponsored by the United States Department of Health, Education and Welfare, Social and Rehabilitation Service between 1955 and 1971, see Dorothy G. Jackson (ed.) Research 1971 (Washington U. S. Department of Health, Education, and Welfare, 1972), pp. 24-32. Of the more than 100 studies listed here none is a bona fide benefit-cost study in the sense that the benefits and costs of a particular program have been identified and estimated in monetary terms.
Since 1964 Mental Retardation Abstracts has been published quarterly by the U. S. Public Health Service. This periodical abstracts journal articles on mental retardation. Although there are many program evaluations abstracted in these pages one looks in vain for a benefit-cost study.

A team at the Department of Social Work of Florida State University has recently issued an initial report on establishing evaluation procedures for Developmental Disabilities Services. The data gathering and evaluation suggested here would make possible cost-effectiveness studies. National Developmental Disabilities Evaluation Project, Department of Social Work, Florida State University, Initial Report. Tallahassee, Florida, December, 1972, 189 pp.

A Specific Program Evaluation

Any number of examples can be offered of program evaluations which do not meet the criteria of benefit-cost analysis. However, one such example may be a useful illustration. A Texas program to assist educable mental retardates move from high school to unsheltered employment has recently been evaluated.[1/] In this program special education instructors assisted the clients to locate job training programs and provided them with counseling and vocational guidance support as they moved from high school to full employment. When it was judged that a student had developed to the point where he was reasonably independent, he was graduated from high school and passed from the program. This study concerns approximately 600 of the over 1600 students enrolled in the program during 1962-63. These 600 were interviewed during January and February in 1963 and were given three tests, the Gordon Personal Profile, the Peck Sentence Completion, and the Brown Self-Report Inventory. On the basis of these tests administered to the 600 students, it was found that those students who were further along in the program, in general "...made better scores on a significant number of the attitudes and personality characteristics measured,[2/]" even when allowance was made for sex, life style, and ethnic considerations. On the basis of these results it is concluded that the "action taken in the Texas Program to improve the attitudes of the students has been effective...[3/]"

This study may be useful for some purposes but it is not a benefit-cost study. No mention is made of the costs of the program, although presumably estimates of its cost could be rather easily determined. The

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1/ Wallace Bloom, "Effectiveness of a Cooperative Special Education Vocational Rehabilitation Program," American Journal of Mental Deficiency, 72 (November, 1967), pp. 393-403.

2/ Ibid., p. 402.

3/ Ibid.

program benefits are said to be positive, but no attempt is made to quantify them in dollar terms so they can be compared with the program costs. The program may actually be a very efficient program or very inefficient but from the analysis presented there is no basis for making any judgment concerning the program's efficiency. Even if we assume that the resources used in the program are to be devoted to the service of the mentally retarded, we are not given any norm for judging whether they are used as effectively as they could be.

To recapitulate, a benefit-cost analysis must: 1) clearly define the objectives of the program; 2) relate these objectives to certain indices of performance, which can be evaluated and quantified as program benefits; and 3) link these program benefits with specified inputs through a production function which permits the inputs to be quantified in relation to specified benefits. In order to be able to evaluate the indices of performance, it is most important that relevant longitudinal data are collected pertaining to the experience of the target population and a control group.

Conley's Analysis

Conley's work represents the only existing comprehensive economic analysis of mental retardation.[1/] It contains a useful institutional

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1/ A project concerning the economic evaluation of mental retardation programs was conducted at the Institute for the Study of Mental Retardation and Related Disabilities of the University of Michigan during 1970-71. A staff summary of the project's efforts and the papers and comments presented at a conference concluding the year's work are included in J. S. Cohen, I. Butter, S. E. Deline, and R. E. Nutter (eds.) Benefit-Cost Analysis for Mental Retardation Programs: Theoretical Considerations and a Model for Application (Ann Arbor: University of Michigan Publications Distribution Service, 1972), 184 pp.

description of current programs relating to mental retardation and the manner in which they are funded. Particularly relevant to our discussion, however, is his chapter, "Benefit-Cost Analysis," in which the nature of his technique is described with particular focus on mental retardation programs. Even though Conley does not provide a strict benefit-cost study with marginal benefits and costs calculated for a specific program, he does estimate average benefits and costs of two mental retardation program areas.

Vocational rehabilitation is the first program area evaluated by Conley. Expenditures for vocational rehabilitation include outlays for case service, counseling, referral, training, and income grants during periods of training. On the basis of 1970 U.S. program data the average lifetime costs for these services discounted to the present by a seven percent rate of discount are $3,703 for mildly retarded cases (IQ between 50 and 69) and $5,044 for moderately retarded cases (IQ between 40 and 49). Although both investment and consumption benefits might well be generated by these expenditures, the problem of estimating the value, for example, of increased productivity from homemaking services or the psychic gains to retardates and others are so formidable that Conley limits his analysis to the estimation of the increased lifetime earnings attributable to the vocational rehabilitation services. For this purpose he assumes that: 1) the trainees will remain in the work force until 69 years of age, 2) unemployment among the trainees will average 20 percent beginning five years after the training and 3) their lifetime earnings should be ascribed totally to the rehabilitation services they have received. Estimated

lifetime earnings are discounted to a present value by a seven percent rate.[1/] On the basis of these assumptions the estimated rate of return to vocational rehabilitation services varies with the age, sex, and degree of retardation of the trainees. As can be seen in Table 1 the benefit-cost ratio for vocational rehabilitation outlays ranges from 14.8 for male, mildly retarded trainees twenty and twenty-five years old down to 0.9 for female, moderately retarded trainees forty-five years old. The principal reasons for this discrepancy are 1) males generally earn more and have a higher labor force participation rate than do females; 2) the work opportunities available to mildly retarded individuals are much broader than for those moderately retarded; and 3) an older person has fewer years in which to recoup the costs of any human investment outlay than does a younger person.

TABLE 1

Value of future earnings generated by each dollar spent on the vocational rehabilitation of the retarded at different ages, discounted at seven percent, 1970

	Age of Retardates When Rehabilitated				
	18 yrs.	20 yrs.	25 yrs.	35 yrs.	45 yrs.
Mildly retarded					
male	$14.2	$14.8	$14.8	$13.5	$10.7
female	8.3	8.4	7.8	6.9	5.7
Moderately retarded					
male	2.2	2.3	2.3	2.1	1.7
female	1.3	1.3	1.2	1.1	0.9

Source: Conley, The Economics of Mental Retardation, Table 53.

1/ With a seven percent rate of discount the present value of increased earnings in the distant future, for example, between 65 and 69 years of age, is negligible.

These results suggest that on an efficiency basis the outlays for vocational rehabilitation in the United States are justified. Only in one category of the program is the benefit-cost ratio less than one. Undoubtedly if benefits other than increased earnings had been evaluated, the benefit-cost ratio would have exceeded one even for the category "moderately-retarded-females-45-years-old." A completely unequivocal policy recommendation for altering the vocational rehabilitation program at the margin, however, cannot be inferred from these estimates of average benefits and costs. But, on the basis of these results and appealing strictly to the efficiency criterion, it does seem likely that total benefits would be increased by a shift of funds in favor of young males who are mildly retarded. Such a recommendation must be qualified once other considerations are introduced. There is, for example, necessarily a built-in bias against females when benefits are measured in terms of market wages. For the same reason programs directed toward older people fare poorly in comparison with those for younger people. The reductio ad absurdum of simple-minded emphasis on investment benefits is that it justifies the death of all retired persons on the grounds that per capita output for the population would thereby be increased.[1/]

Conley has also estimated the relationship between lifetime earnings of retardates and the cost of the education services provided them. He

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1/ Mishan, however,points out that even on an efficiency basis alone such a conclusion must be rejected because efficiency benefits include consumer as well as investment benefits and the feelings of potential decedents are consumer benefits. See E. J. Mishan, "Evaluation of Life and Limb: A Theoretical Approach," Journal of Political Economy 79 (1971), p. 690. But such niggling serves only to point up the inherent limitation of all economic analysis.

estimates that the ratio of the present value of lifetime earnings[1/] to these costs, both discounted by a rate of seven percent, ranges between five and ten for mildly retarded males, between one and 2.5 for mildly retarded females, and ranges downward from 1.0 for all moderately retarded individuals. These are admittedly crude estimates based on the strong assumption that the entire earnings of retarded individuals are attributable to education. In defense of this assumption Conley argues that, in the absence of education, a retarded person is considerably more disadvantaged than the nonretarded person who can fall back on greater natural endowments. Totally bereft of training, a retarded individual may be simply unable to hold a remunerative job. Such is not as likely to be true of nonretarded individuals lacking formal education. But even if we accept this line of reasoning these results give us little guidance as to how to adjust educational services at the margin since, as in the vocational rehabilitation analysis, the benefit-cost ratios are expressed in terms of average rather than marginal values. From an average benefit-cost ratio ranging between five and ten we cannot validly conclude that an additional dollar in educational expenditure, say for mildly retarded males, will generate investment benefits of between five and ten dollars. We merely know that this relationship exists for total program outlays in the past. The other caveats made above concerning the results of the vocational rehabilitation expenditures apply with equal force here.

4. CONCLUDING CRITIQUE OF BENEFIT-COST ANALYSIS

Over the past decade benefit-cost analysis has moved from the fairly

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1/ Estimates of lifetime earnings incorporate the effect of unemployment rates, which are derived from a number of studies.

restricted confines of water resource evaluation into general budgetary analysis touching all major governmental programs. Consequently its strengths and weaknesses are no longer matters for merely speculative discussion by a small group of specialists. The resolution of controverted questions can have considerable practical impact. In the light of its track record benefit-cost analysis may now itself be judged by a benefit-cost criterion. Has it proved to be a better mouse trap? Predictably the early sanguine hopes of some enthusiasts have not been fulfilled. The terrain of policy analysis seems as tangled and pockmarked by uncertainty, ignorance, and controversy as ever. Consequently the naive euphoria concerning program evaluation which was evidenced in some quarters a few years back is clearly untenable today. Indeed a policy cynicism is evident which contends that as we have muddled through in the past so we shall muddle through in the future. Plus ca change...

Wildavsky's counsel, for example, is waxing. From the beginning he and other political scientists have been insistent and articulate critics of benefit-cost analysis, charging that policy analysis is radically changed rather than being aided by PPBS.[1/] The consistent, central thrust of this complaint has been that the focus of benefit-cost analysis is unrealistically restrictive. Successful legislators and bureaucrats, so the brief reads, have developed a nuanced appreciation for all the factors contributing to successful policy decisions,

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1/ See, for example, Aaron Wildavsky, "Rescuing Policy Analysis from PPBS," Public Administration Review, 29 (1969), pp. 189-192; see also his "The Political Economy of Efficiency: Cost Benefit Analysis, Systems Analysis and Program Budgeting," Public Administration Review 26 (1966), pp. 292-310.

with economic efficiency only one aspect of this whole pattern. Consequently any evaluation technique which fails to give overriding weight to larger political considerations must be rejected. Otherwise the careful balance between the legislative bodies and the line agencies will be upset.[1/]

These contentions merit serious consideration. An inference sometimes drawn from them, however, seems more questionable. To establish that economic efficiency should not dominate policy considerations is one thing. To assert that economic costs are irrelevant is quite another. Efficiency presumably is an important aspect of all policy questions. It would seem especially to be a central consideration for humanitarians striving in the face of resource constraints to assist individuals that society has labeled "mentally retarded." In the field of health and welfare programs "efficiency" and "effectiveness" are the synonyms, "efficiency" and "miserliness" the contraries. Considerable misunderstanding still shrouds these matters. As Williams has observed, "...it needs to be clearly understood that attempting to place a money value on non-traded 'goods' does not imply <u>either</u> that one is advocating the establishment of 'markets' in such goods <u>or</u> that one is restricting

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1/ However, rather than the whole political structure having been shaken by the narrow considerations of economic evaluation, it seems that sometimes administrators have used program evaluations themselves as political instruments: producing them when they are expected to give the "correct" political answer; failing to generate them, or surpressing them,when they might prove politically embarrassing. Perhaps "political" considerations may account at least partially for the great variance across federal programs in the funds spent for program evaluation. In a study of fifteen federal programs in four federal agencies in 1969 it was found that the cost of evaluation ranged from zero to 6.3 percent of total program outlays. The average for all fifteen programs was 0.4 percent. See Joseph S. Wholey, <u>et. al.</u>, <u>Federal Evaluation Policy</u> (Washington: The Urban Institute, 1971), p. 79.

one's attention to their 'economic' attributes. Thus if I try to place a 'value' on the reduction of road accidents, I am not advocating that the victims should be required to pay for medical treatment or that they should be compensated, nor am I solely concerned with the effects on GNP. Thus use of money as a common measuring rod in making diverse values commensurable is not to be confused with an obsession with the more sordid aspects of profit-maximization."[1/]

However, even if economic efficiency is accepted as bearing directly on the overall success of any program, this does not necessarily establish the usefulness of benefit-cost analysis. Precisely because it is used to evaluate programs for which commensurable values are not readily available, benefit-cost analysis is often beset with intractable technical problems. A major difficulty with any such evaluation pertains to the interpretation of a program's effects. Theoretically the effects of a program are the difference between the situation "with program" and "without program." Attributes of an experimental group are contrasted with attributes of a control group with the difference being the effect of the program. In practice it may well be erroneous to assume that the "before program" values are a good proxy for the "without program" values. Phenomena may be invalidly attributed to the program in question when in fact other events occurring simultaneously with the program are at least partially responsible for the outcome.

1/ Alan Williams, "Cost-Benefit Analysis: Bastard Science? And/Or Insidious Poison in the Body Politick," Journal of Public Economics 1 (1972), p. 209.

Two further problems are potentially troublesome in the evaluation of mental retardation programs.[1/] The first is the policy of "creaming." Typically the most likely subjects are the ones initially accepted into a program. To the extent that this practice occurs, the evaluation of any ongoing program provides an overly sanguine picture of what can be expected from a program extension with its likely lower benefits and higher costs. A second problem concerns program interdependency. A certain minimum level of education, for example, may be a necessary but not a sufficient condition for the realization of such diverse benefits as satisfactory adult adjustment and increased earnings. Unfortunately there is no entirely successful way of unequivocally allocating these benefits to the various programs responsible for them.

Indeed, in the final analysis the major payoff from a benefit-cost analysis may well not be a specific number which represents the "commensurable net benefit" of a program. Of more importance may be the discipline imposed by the benefit-cost procedure which has focused attention on questions which might have gone unasked.[2/] For example, a benefit-cost exercise may be the occasion for comparing the benefits

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1/ For a discussion of such problems, see Ronald W. Conley, The Economics of Mental Retardation (Johns Hopkins University Press, 1973), Chapter VI.

2/ Another benefit is suggested by Millikan: "The purpose of social science research should be to deepen, broaden, and extend the policy-maker's capacity for judgment--not to provide him with answers. Thus, the test of effectiveness will be not in whether the research leads to a new and unfamiliar conclusion but in whether it clarifies and makes explicit the logical bases for a conclusion already perceived or suspected." Max F. Millikan, "Inquiry and Policy: The Relation of Knowledge to Action," in The Human Meaning of the Social Sciences (New York: Meridian Books, 1959), p. 167.

from outlays for research and prevention programs with the return to treatment programs. Or the focus of attention may be broadened to extend beyond the spectrum of mental retardation programs to income maintenance programs. The strategy offering the most promise for reducing mental retardation in the future might well be the adoption of a generous income maintenance policy coupled with efforts to generate higher income for low-income families, such as a vigorous pursuit of full employment policies even in the face of considerable price inflation. The possibility of such a strategic approach to the problem of mental retardation is suggested by the often observed inverse correlation between family income and mental retardation. "Contrary to the mode of thinking illustrated by medical research, no spectacular breakthrough can be made until the whole structure of the culture of poverty is destroyed, a structure which includes sub-standard housing, underemployment, inferior education, inadequate health services, poor nutrition and discrimination. Each facet of poverty overlies the other in the etiology of pseudo-mental retardation."[1/] In other words, the principal benefit from benefit-cost analysis may be that pertinent questions are formulated rather than definitive answers supplied.[2/]

1/ Rodger Hurley, Poverty and Mental Retardation (New York: Vintage Books, 1969), pp. 72-73.

2/ The focus of discussion in this paper has been on benefit-cost analysis, narrowly construed. However, it should not be inferred from this emphasis on one type of analysis that other forms of evaluation are not useful. For a brief discussion of types of evaluation undertaken by the federal government, see Joseph S. Wholey, et. al., Federal Evaluation Policy (Washington: The Urban Institute, 1971), pp. 24-27.

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